Claims

1. A method of refrigeration using a thermochemical system comprises three reversible phenomena involving the gas G in three chambers (EC), (1) and (2), the respective equilibrium temperatures $T_{E(EC)}$, $T_{E(1)}$ and $T_{E(2)}$ at a given pressure being such that $T_{E(EC)}<T_{E(2)}<T_{E(1)}$, the chambers (1) and (2) being in thermal contact, wherein, starting from a state in which the three chambers are at ambient temperature and at the same pressure:

- in a first step, the chamber (1) is isolated and the chambers (EC) and (2) are brought into communication in order to carry out the exothermic synthesis in (2), the heat produced being absorbed by the chamber (1);

- in a second step, the chamber (2) is isolated and the chambers (EC) and (1) are brought into communication in order to carry out the exothermic synthesis in (1), the heat produced being absorbed by the chamber (2); and

- in a third step, the three chambers are brought into communication and thermal energy is supplied to the chamber (1) in order to carry out the exothermic decomposition steps in (1) and in (2), for the purpose of regenerating the installation, which is then left to return to the ambient temperature.

2. The method as claimed in claim 1, wherein:

- in the initial state, the chambers (EC), (1) and (2) are isolated from one another and placed at the ambient temperature, the chambers (1) and (2) contain their respective sorbent S1 and S2 in the state lean in gas G, and the chamber (EC) contains G in the liquid state or the sorbent in the state rich in gas G;

- during the first step, bringing the chambers (EC) and (2) into communication causes refrigeration in the chamber (EC) at the equilibrium temperature in (EC) corresponding to the pressure in the assembly formed by (2) and (EC);

- during the second step, bringing the chambers (EC) and (1) into communication causes refrigeration in the chamber (EC) at the equilibrium temperature in (EC) corresponding to the pressure in the assembly formed by (1) and (EC); and

- during the third step, bringing the three chambers into communication causes synthesis in (EC) and decomposition in (2), and then applying thermal energy to (1) causes decomposition in (1).

3. The method as claimed in claim 1, wherein the reversible phenomenon in the reactors (1) and (2) is chosen from reversible chemical reactions between the gas G and a solid, adsorptions of the gas G on a solid, and absorptions of the gas G by a liquid.

4. The method as claimed in claim 1, wherein the reversible phenomenon in the device (EC) is a liquid/gas phase change.

5. The method as claimed in claim 1, wherein the reversible phenomenon in the device (EC) is a sorption chosen from reversible chemical reactions between the gas G and a solid, adsorptions of the gas G on a solid, and absorptions of the gas G by a liquid.

6. An installation for implementing the method as claimed in claim 1, comprising an endothermic component consisting of a device (EC) and an exothermic component consisting of a reactor (1) and a reactor (2), wherein:

- the reactors (1) and (2) are in thermal contact so that each of them constitutes an active thermal mass for the other;

- the reactors (1) and (2) and the device (EC) are provided with means for bringing them selectively into communication;

- the reactor (1) and the reactor (2) are provided with heating means (6) and heat extraction means (5); and

- at the start of a cycle:
  * the reactors (1) and (2) contain a sorbent S1 and a sorbent S2, respectively, capable of participating in a reversible sorption involving a gas G, the equilibrium temperature of the reversible sorption in (1) being higher than the equilibrium temperature of the reversible sorption in (2) at a given pressure; and
  * the device (EC) contains a compound G capable of undergoing a liquid/gas phase change or an SEC+G sorbent rich in gas G capable of participating in a reversible sorption, the equilibrium temperature of which is below the equilibrium temperature of the reversible sorption in the reactor (2).

7. The installation as claimed in claim 6, wherein the device (EC) is in direct thermal contact with a reservoir (3) containing water.

8. The installation as claimed in claim 6, wherein the device (EC) furthermore contains a liquid/solid phase change material, the phase change temperature of which is below the refrigeration temperature.

9. The installation as claimed in claim 6, wherein the device (EC) is an evaporator which consists of a cylinder (8) which is closed at its two ends, the circular cross section of which cylinder includes, in its upper part, a concave circular arc corresponding to the cross section of the ice tray (7), which evaporator furthermore includes:

- the hollow fins being occupied by a solid/liquid phase change material;

- a tube (10), connected to a pipe transferring the gas G between the evaporator and the reactor (2), runs into the cylindrical chamber of the evaporator via a bore made in one of the ends of the cylinder, which

tube is placed directly beneath the wall of the ice tray (7), the working gas G in the form of a boiling liquid being placed in the bottom of the evaporator.

10. The installation as claimed in claim 6, wherein the reactor (1) is placed inside the reactor (2).

11. The installation as claimed in claim 10, wherein the reactors (1) and (2) are concentric, the reactor (1) being placed inside the reactor (2).

12. The installation as claimed in claim 6, wherein each of the reactors (1) and (2) is formed by several hollow plates containing the respective sorbents, the plates of one reactor alternating with the plates of the other.

13. The installation as claimed in claim 8, wherein the difference between the phase change temperature of the phase change material and the refrigeration temperature is from 1°C to 10°C.